

serviceable modifications. He concludes his extensive studies thus:—

1. The Weigert-Pal process consists in the incomplete oxidation of a stain from mordanted fibrils containing it as a lake, and bears no necessary relation to the occasional presence of a medullary sheath round these.

2. If an ordinary mordant dye, such as logwood, be used, a metallic salt, to mordant the fibres previously, is necessary.

3. If a basic dye, such as methylene blue, soluble in water, be used, double mordanting with tannic acid, and afterwards with tartar emetic is necessary.

4. The ordinary Weigert-Pal result can be obtained by the use of osmic acid alone, as this forms a jet black lake with hematoxylin in the absence of other metals.

5. Almost as good or equally good results can be obtained by the use of a 2 per cent. solution of iron-alum, ammonium molybdate, ferric chloride, stannous chloride, sodium tungstate, uranium acetate and potash alum; and much inferior results arranged in order of their value can be obtained by the use of similar solutions of nickel sulphate, chrome alum, and the chromates, copper acetate, cobalt nitrate, citrate of bismuth and ammonia, ammonia alum, manganese sulphate and zinc sulphate.

6. Osmic acid and usually iron alum cause a practically equal staining of the medullary sheath and of the axis cylinder, whilst the other metals chiefly cause staining of the axis cylinder, the medullary sheaths being either slightly stained or quite unstained, according to the metal employed. JELLIFFE.

III. UEBER DIE MARKSCHEIDENBILDUNG DER GEHIRNNERVEN DES MENSCHEN (On the Development of the Myelin Sheath in the Human Brain). A. Westphal (Arch. f. Psych., 20, 1897, p. 474).

The author has studied the development of the myelin sheaths in the brains of newly-born children and in the fœtus. He comes to the following general results:—

(a) The Cranial Nerves.

1. Two groups are here to be distinguished with reference to the development of the medullary sheath. The motor cranial nerves are myelinated at birth, the sensory and mixed nerves are not myelinated, with the exception of the acoustic, which is myelinated early. The optic nerve at its distal end develops latest.

2. The process of myelination proceeds from the central nervous system towards the periphery.

3. With the exception of the optic, the calibre of the nerve fibres increases with age, so that at maturity the calibre may have increased four or five times.

(b) Comparison with the peripheral spinal system.

1. Myelination occurs earlier in the cranial nerves than in the peripheral nervous system.

2. The differences found existing between motor and sensory nerves in the cranial nervous system could not be found for the peripheral spinal system. JELLIFFE.

PHYSIOLOGY.

112. THE THEORY OF THE MOVEMENT OF THE NEURON AS APPLIED TO NORMAL AND PATHOLOGIC MENTAL AND NERVOUS PROCESSES. F. X. Dercum, M.D. (Gaillard's Med. Jour., 66, 1897, p. 342).

The behavior of the neurons in a case of transient hysterical paralysis may be given as an illustration of the simplest expression

of this theory. What is it that happens in the nervous system when an arm, for instance, is suddenly paralyzed, remains so for a time, and again suddenly recovers its functions? The neurons of the motor area of the cortex present not only protoplasmic extensions directed towards the surface of the cortex, but also an extension downward, which becomes a nerve fibre, but which is, properly speaking, a process of the cell body. This process extends downward through the white matter of the brain and terminates in the cord in a brush-like extremity. By means of this end tuft the cortical cell is brought into relation with the motor nerve cells in the cord. The relation between this end tuft and the nerve cell in the anterior horn of the cord is probably one of contact, and not actual continuity of structure. In a case of hysterical paralysis of the arm, resulting, for instance, from an emotional shock the neurons of the arm centre of the cortex retract their processes in such a way that their end tufts in the spinal cord no longer bear their normal relation to the spinal neurons, and the connection between the cells is broken. The disappearance of the paralysis is due to the extension of the processes previously retracted—that is, the end tufts resume their normal relations with the spinal neurons and function is re-established. Sleep has been commonly attributed to an anemia of the brain, notwithstanding the fact that true cerebral anemia, such as follows great loss of blood, is attended with insomnia. The movements of the neurons will account for sleep. When functionally active they must be in relation with one another and their processes either in contact or nearly so. Evidently this condition is a prerequisite of consciousness. When the nerve cells are exhausted by fatigue, their volume and contents diminish, as we have every reason to infer from the experiments of Hodge. In sleep the neurons have their processes retracted; in consciousness their processes are extended. This theory also enables us to explain pathologic unconsciousness, such, for instance, as attends cerebral concussion. A man receives a blow upon the head; the neurons suddenly retract their processes and unconsciousness results. It is extremely probable that the unconsciousness of chloroform or ether anesthesia, or the sleep produced by drugs may be explained similarly. A sequence of sound vibrations impinging upon the peripheral auditory neurons produces a change that affects the relations which their centripetal processes bear to the nerve cells of the auditory nuclei of the medulla, and secondarily to the neurons in the auditory area of the cortex. It is probable that the effect produced upon the latter is such as to cause them to retract, extend or otherwise move their processes. The same sequence of sound vibrations must always produce the same changes in the cortical neurons. The physiology of conception evidently consists in the reforming among the neurons of an old combination—that is, the combination, the same as, or similar to, what was originally produced by a physical impression upon the organs of sense, but which is now produced by some other agency. To explain the phenomena of memory, we will say that a sequence of sound vibrations has impinged upon the peripheral auditory neurons and in turn has caused the neurons of the auditory cortex to move their processes. Other things equal, the degree of the excitation depends upon the intensity of the physical impact upon the auditory apparatus. Evidently the number of auditory neurons aroused into action varies greatly, and the movement does not cease in the auditory area of the cortex, but is diffused among distant neighboring areas. Suppose a sequence of sound vibrations has caused the auditory neurons to assume new relations with one another. These relations will depend largely, whether or not a similar sequence of impressions has passed

through those neurons before. If so, the old combinations will be reformed, and as a corollary, there follows the recognition by the ego of the sounds as something heard before. Sequence of thought may also be explained by the movements of the neurons. If they are constantly changing from the hour of awakening and responding to stimuli from without by changes in their relation to one another, it follows that the sequence of thought depends upon the sequence of these changes. Herein also lies the explanation of the continuity of thought. This theory is also applicable to various pathologic conditions. An hallucination is the spontaneous formation of an old combination among the neurons representing a former perception or conception as the result of pathologic conditions and not in response to normal stimuli from within, such as preceding and connected trains of thought, or other normal psychic processes. The combination representing an hallucination reacts in such a manner upon the general neurons of the cortex as to give rise to the belief in the reality of the manifestation. An illusion is such a faulty combination of the neurons as to lead to an imperfect recognition by the ego of the object perceived.

It is probable that the explanation of the pathology of a delusion is to be sought in disease of the structure of the neuron and especially of its processes. All the symptoms presented by hysteria, and even the convulsions, can be explained by this theory. The mobility of the neuron is the only theory that affords a rational explanation of hypnotism. Hypnotism is a partial sleep, in which only a portion of the neurons have their processes retracted. When hypnosis is induced by staring fixedly at an object, while suggestion of sleep is made, it happens by reason of the effort of visual and auditory attention that the neurons of the corresponding regions in the cortex are thrown into certain relations with one another, corresponding first to the action upon the ocular apparatus and, second, to the words of the operator. Soon, by reason of visual fatigue and under suggestion of sleep, the neurons of the visual area retract their processes, and the partial sleep of hypnosis begins. Gradually it grows deeper, by reason of the same influence, the other neurons of the cortex gradually retract their processes, with the single exception of those by means of which the verbal suggestion of sleep has been received, namely the auditory channels.

FREEMAN.

113. SULLA FISILOGIA DEI TALAMI OTTICI (The Physiology of the Optic Thalamus). Lo Monaco (Riv. di patol. nerv. e ment., 2, 1897, No. 8).

The author reports the results of three partial excisions of the optic thalamus in dogs, the operation having been performed in the manner detailed by him in a former communication. In two cases only the inner portion; in the third, both outer and inner portions of the dorsal part of the thalamus of one side were removed. Blindness, diminution of sensibility and impairment of muscular power set in on the side opposite to that of the injury, but disappeared after a period of about four weeks.

The conclusion of the author is that the optic thalamus is the seat of a visual perception centre similar to the one found in the cortex, but with the difference that its removal does not cause either dilatation or loss of contractile power of the pupil. The relation of the thalamus to sensation and mobility is similar to that of the cortical centres.

JELLIFFE.